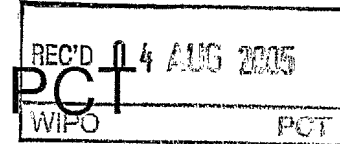


PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY



To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2005/008805

International filing date (day/month/year)
16.03.2005

Priority date (day/month/year)
11.06.2004

International Patent Classification (IPC) or both national classification and IPC
G06T1/00

Applicant
APPLE COMPUTER, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2005/008805

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2005/008805

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-4, 13-40, 42-45
	No: Claims	1, 41
Inventive step (IS)	Yes: Claims	2-4, 13-40, 42-45
	No: Claims	5-12
Industrial applicability (IA)	Yes: Claims	1-45
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V.

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 41 is not new in the sense of Article 33(2) PCT.
2. Reference is made to the following documents:
D1 : US 2003/174136 A1 (EMBERLING BRIAN D ET AL) 18 September 2003 (2003-09-18)
D2 : HAEBERLI P ET AL: "THE ACCUMULATION BUFFER: HARDWARE SUPPORT FOR HIGH-QUALITY RENDERING" COMPUTER GRAPHICS, NEW YORK, NY, US, vol. 24, no. 4, 1 August 1990 (1990-08-01), pages 309-318, XP000604382 ISSN: 0097-8930

Document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

a graphics system having i.a. a configurable multipurpose memory in which i.a. an accumulation buffer can be configured (abstract, paragraphs 8, 10).

The accumulation buffer of D1 is used in a conventional way (e.g. as described in D2 or other documents cited in the ISR), namely to allow accumulation operations to be repeatedly performed without using the frame buffer as both a data source and a data destination for the same operation.

3. From prior art document D1 it appears that the following features of present independent claim 1 are known.

Creating an accumulation buffer (claim 1, step a) is possible, according to D1, by either software means (paragraph 83) or hardware means (paragraph 84), whereby said configurable multipurpose memory "may be configured to include" (paragraphs 8 and 9) such an accumulation buffer.

Reading a portion of the data of accumulation buffer, creating results therefrom and writing said results onto the accumulation buffer (claim 1, steps b to d) is anticipated in

D1, paragraph 77, the only unsubstantial difference being that said steps are carried out by a "hardware accelerator" in D1 as opposed to the claimed "graphics processing unit".

4. Hence claim 1 and, insofar it refers to it, claim 41 simply recite the conventionally known use of an accumulation buffer.

Consequently, their subject-matter is not new over the known prior art, e.g. D1 or D2.

5. Independent claims 13, 29 and 42 are instead considered novel (Article 33(2) PCT) and involving an inventive step (Article 33(3) PCT) over the available prior art, as they refer to (using) a separate buffer, in which a portion of the data of the accumulation buffer is loaded, said separate buffer being itself used as a (conventional) accumulation buffer, the results being written in the accumulation buffer. (Such a separate buffer might be defined as an accumulation buffer of second level).

The problem to be solved by the present invention may be regarded as providing a fast and flexible way to perform cumulative operations in consideration of the fact that plural GPUs or program threads cannot perform exclusive read/modify/ write sequences on the same buffer at the same time

None of the available prior art documents anticipates or even only suggests the claimed separate buffers used in connection with conventional accumulation buffers.

6. While dependent claims 14-28, 30-40 and 42-45 are dependent on claims 13, 29 or 42 and as such also meet the requirements of the PCT with respect to novelty and inventive step, dependent claims 2 to 4 also include, directly or by reference, said novel and inventive subject-matter, but they appear redundant e.g. with respect to claims 13, 19 and 23, respectively.

Dependent claims 5 to 13 appear instead to refer to the common use and to implementation details of a conventional accumulation buffer and do not meet the requirements of Article 33(2) or 33(3) PCT, as the case may be.